

# Cross-Agency Coordination of Per- and Polyfluoroalkyl Substances (PFAS) Activities

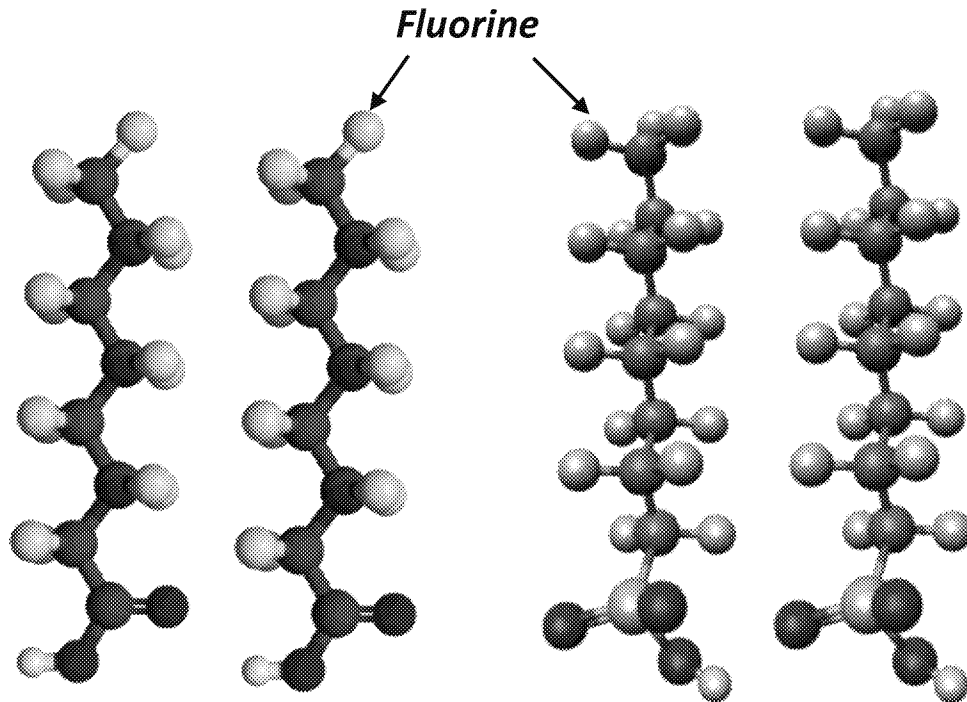
**Chris Impellitteri**

*US EPA's Safe and Sustainable Water Resources Research Program*

**Region 5 and Neighboring States' Visit to US EPA Cincinnati  
February 2, 2018**

# What is a PFAS?

Thousands of PFAS in production of industrial and consumer products.



*Perfluorooctanoic acid  
(PFOA)*

*Perfluorooctanesulfonic  
acid (PFOS)*

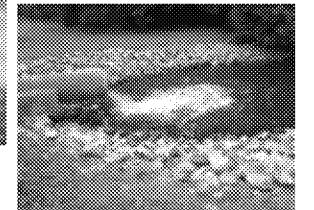
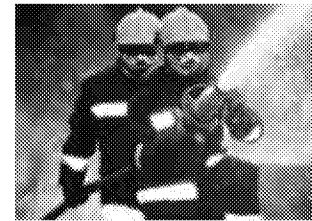
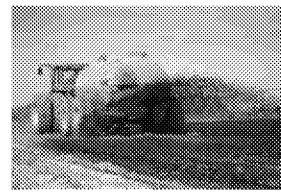
## A class of man-made chemicals

- Chains of carbon (C) atoms bonded by fluorine (F) atoms
  - “Per”-all H on carbons replaced by F
  - “Poly”-at least one H replaced by F
- C-F bond makes them
  - Very stable
  - Hydrophobic
  - Lipophobic
  - Excellent emulsifiers, wetting agents, dispersants
- PFAS may include oxygen, hydrogen, sulfur and/or nitrogen atoms

# Problem

## An Environmental Health Challenge

- **Environmental contamination/human exposure**
  - Chemical class includes thousands of different chemicals
  - Highly persistent (doesn't breakdown in the environment)
  - Released during production and industrial application
    - Emissions to air
    - Discharges to water
    - Widespread contamination
  - Consumer product use: food packaging, stain resistant materials, non-stick cookware and firefighting foam
  - Conventional drinking water (DW) treatment ineffective (Rahman et al., 2014)
  - Lack validated methods for measurement of most new-generation PFAS
- **Human health effects for PFOA and PFOS well established based on human epidemiology and animal studies**
  - Low infant birth weights, effects on the immune system, liver effects, increased cholesterol levels, cancer and thyroid hormone disruption
  - Largely unknown for other PFAS
- **Many states are dealing with PFAS issues; some communities working to respond and asking for assistance**



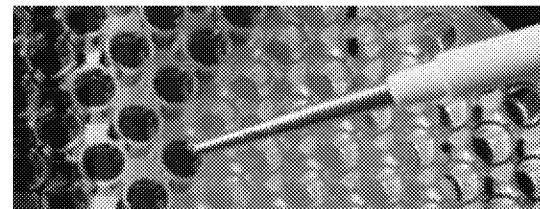


# EPA's PFAS Coordinating Committee

- **US EPA announced cross-Agency effort to address PFAS in December 2017**
- **As part of that effort, US EPA will:**
  - Identify a set of near-term actions that the Agency will take to help support states and local communities
  - Enhance coordination with states, tribes and federal partners to provide communities with critical information and tools to address PFAS
  - Increase ongoing research efforts to identify new methods for measuring PFAS and filling data gaps
  - Expand proactive communications efforts with states, tribes, partners and the American public about PFAS and their health effects
- **US EPA's Office of the Science Advisor and Office of Water are leading these efforts**
  - Includes members from Agency's air, chemicals, land, water, enforcement and research offices, as well as regions, to enhance cooperation with partners at the state and local level

# Current Research Activities

- Human Health/Toxicity
- Analytical Methods
- Site Characterization/Exposure
- Remediation/Treatment



# Human Health/Toxicity

- **Problem:** Lack of toxicity data for many PFAS compounds
- **Action:** Literature review of existing toxicity data. Build PFAS standards repository. Fill knowledge gaps through computational toxicology and rapid/high-throughput screening.
- **Results:**
  - Literature review near completion
  - Developing standards repository (over 100 PFAS thus far obtained); target approximately 300
  - Developmental neurological effects (Zebrafish assay) performed on PFAS
    - Sulfonic acid containing compounds (e.g. PFOS, PFHxS) exhibited toxicity. Non sulfur containing compounds did not (GenX, ADONA, PFOA, PFHxA)
- **Impact:** Provide timely results for risk communication and management decisions at affected sites

# Analytical Methods

- **Problem:** Lack of standardized/validated analytical methods for media other than DW. Also need to address methods for “short-chain” analytes.
- **Action:** Perform multi-laboratory validations for analytical methods for non-DW samples and solids to develop SW-846 Methods for site characterization
- **Results:**
  - R5 Direct Injection analytical method external validation study to commence in February 2018
  - Draft SW-846 Method for Isotope Dilution procedure in review. This method will address Department of Defense (DoD) analytical requirements for PFAS. One internal validation (February 2018) followed by 10-lab external validation (April 2018)
  - Solids method SW-846 draft to be circulated for internal review in April 2018
  - Method development for short-chained PFECAs (GenX, ADONA) in DW underway (OW/ORD collaboration, target for public review January 2019)
- **Impact:** Provide standardized analytical guidance for meeting a variety of site characterization needs

# Site Characterization / Exposure

- **Problem:** Knowledge gaps on exposure and site-specific concentrations of PFAS compounds
- **Action:** Develop non-targeted analysis (NTA) methods for qualitatively/semi-quantitatively assessing the types of PFAS in environmental samples
- **Results:**
  - NTA methods considered for future site characterization
- **Impact:** Provide stakeholders with new methods to assess site contamination and potential exposure to PFAS



# Remediation / Treatment

- **Problem:** Soil/groundwater and drinking water contamination
- **Action:** Update the DW treatability database to include PFAS other than PFOA and PFOS. Conduct research on treatment technologies and processes for short-chained PFAS in DW with an emphasis on small systems. Collaborate with DoD on in-situ treatment processes for groundwater contamination.
- **Results:**
  - Working with US EPA's Office of Water to update the treatability database to expand to PFAS other than PFOA/PFOS and include cost models for treatment technologies
  - Conducting bench-, pilot- and full-scale research on carbon and ion exchange technologies for the removal of PFAS. Collaboration with the Water Research Foundation
  - Collaborating with the Air Force Institute of Technology for the in-situ treatment of groundwater
- **Impact:** Improved treatment strategies for removing PFAS from DW and source water



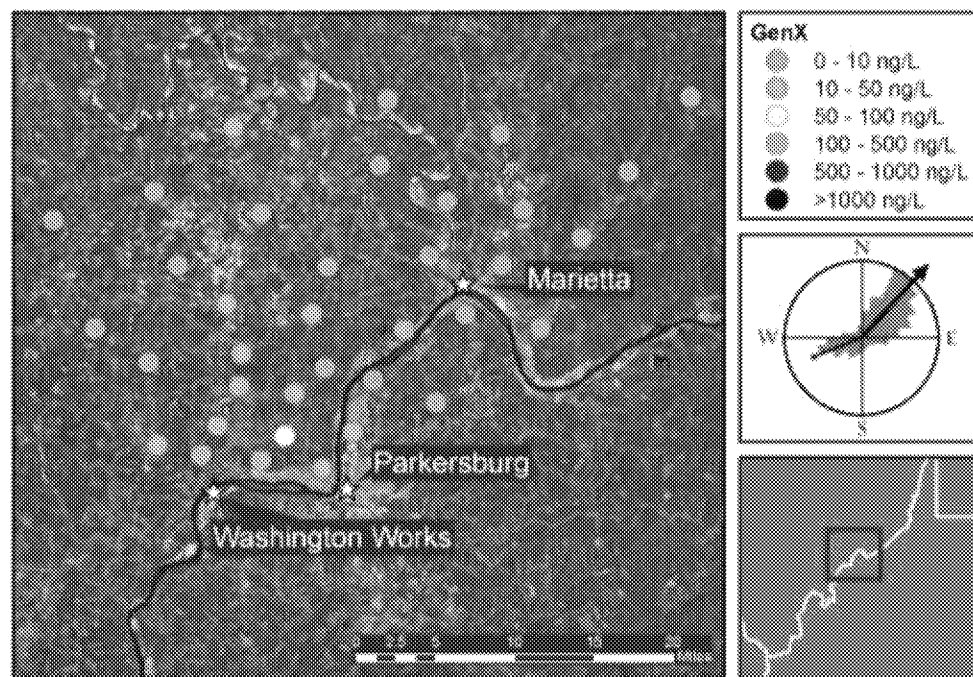
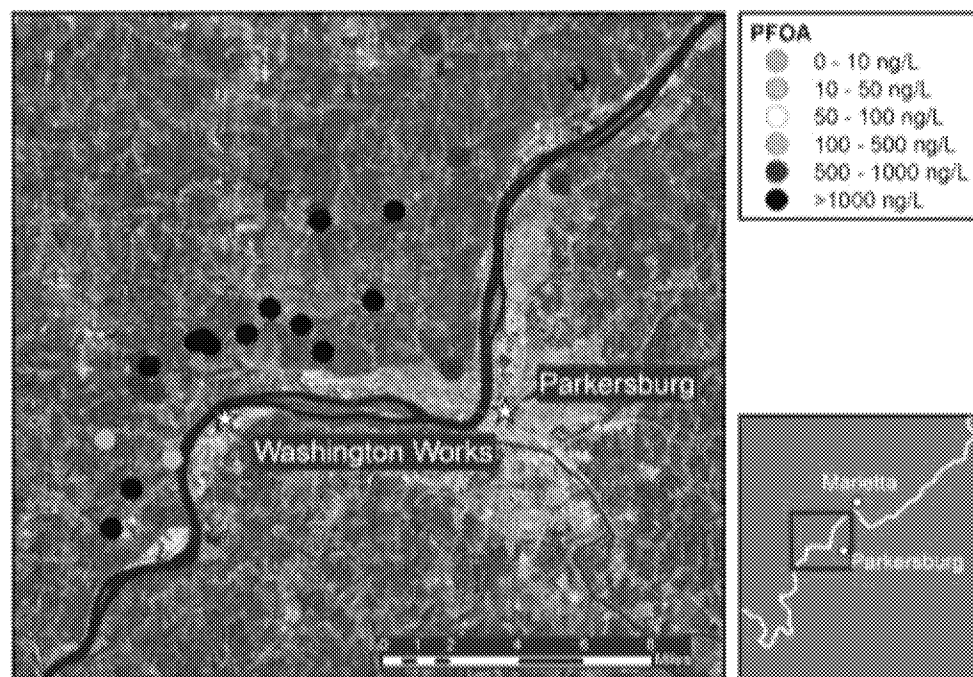
# Technical Support to States

## North Carolina Example

- US EPA, in collaboration with NC State University, has been conducting PFAS research in the Cape Fear River for the last 10 years
- Recent work using non-targeted analysis identified ~7 novel PFAS in the Cape Fear River downstream (but not upstream) of a chemical production plant producing Gen X and Nafion
- GenX was also found in downstream finished DW
  - Mean concentration of 631 ng/L (ppt)
  - Local press picked up on the published results
- Upon discovery, NC Department of Environmental Quality (DEQ) worked with the chemical production facility to reduce discharges under their permit
- NC Department of Health established a Health Goal for GenX in DW (140 ppt)
- NC DEQ and US EPA partnered to monitor the effectiveness of discharge reduction, sampled over 8 weeks at 13 locations, established that GenX levels in DW fell below the Health Goal after several weeks
- Continued sampling by NC DEQ has also found PFAS in well water near the facility; actions are ongoing. NC DEQ continues to monitor the effectiveness of discharge reduction efforts; Region 4's Science and Ecosystem Support Division provides analytical support.

## US EPA Collaboration with Ohio State University: Parkersburg, WV

- Three rounds of field sampling in 2016.
- The 2016 sampling done by the ORD/OSU study found results for PFOA occurrence in the environment consistent with data the Agency has collected in Region 3 over the past 10-12 years.
- The discovery of GenX at many of the collection sites suggests the replacement PFAS is moving via air deposition as well as water.



# PFAS Activities with State Partners

## EPA-ECOS-ASTHO Memorandum of Agreement

### **Communicating the Risks of PFAS: State Case Studies and Toolkits**

US EPA ORD is funding a project with the Environmental Council of States (ECOS) and the Association of State and Territorial Health Officials (ASTHO). ECOS and ASTHO are compiling case studies as fact sheets, consisting of interviews and findings, with the goal to better understand how these state agencies manage their PFAS risk communication to the public.

- **Expected Outputs:**

- Report on existing risk communication toolkits
- ECOS states for PFAS state case studies (PA, MI and NH); ASTHO states (CO, MN and NY)
- Webinar showcasing PFAS state case studies and risk communication strategies (June 2018)

- **Expected Outcomes:**

- Improve public health, due to a greater awareness of PFAS risks
- Build diverse public health and environmental partnerships with states and their communities
- Increase understanding of state practices and experiences around PFAS risk communication strategies

### **ECOS-EPA Bimonthly PFAS Calls**

Coordinate calls with ECOS/states to share information on PFAS methods, toxicity and treatment work (next call is scheduled February 26, 4-5 pm ET)



# Contact

## **Chris Impellitteri**

US EPA Office of Research and Development

Safe and Sustainable Water Resources Research Program

Cincinnati, OH

513-487-2872

[impellitteri.christopher@epa.gov](mailto:impellitteri.christopher@epa.gov)